A NEW SPECIES AND NEW RECORDS OF *HYPOCHRYSOPS* C. & R. FELDER (LEPIDOPTERA: LYCAENIDAE) FROM PAPUA NEW GUINEA

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Abstract

The previously unknown female of *Hypochrysops lucilla* D'Abrera, stat. rev., is recorded and figured from the Crater Mountain Wildlife Management Area, central Papua New Guinea. *Hypochrysops lustrare* sp. n. is described from the same area and compared with the closely related *H. theon* C. & R. Felder. Distributional and biological data are presented for a further six species of *Hypochrysops* C. & R. Felder from the same area, and reference made to the larva and foodplant of an unidentified species of *Hypochrysops*.

Introduction

The Crater Mountain Wildlife Management Area (CMWMA) straddles three provinces in central Papua New Guinea – Eastern Highlands, Chimbu and Gulf Provinces. The CMWMA and the scientific research programmes conducted within it are managed by the Research and Conservation Foundation of Papua New Guinea (RCF), administered from Goroka, Eastern Highlands Province. Altitudinal range of the CMWMA is from near sea level (50 m altitude on the Purari River) in the Gulf Province to 3100 m. It contains extensive pristine areas of lowland and upland rainforest, merging to montane forests and subalpine scrub on the summit areas of Crater Mountain. The village of Haia is centrally located within the CMWMA and was the base for field work conducted by one of us (DL), as reported and discussed here. This followed an invitation from the RCF to document butterfly foodplants in the general area of Haia, as well as to catalogue the Sphingidae and Saturniidae of the area. Some observations on the butterflies of the Haia area were made and the results of observations on the genus *Hypochrysops* C. & R. Felder are presented here.

Abbreviations used are: ANIC - Australian National Insect Collection, CSIRO, Canberra; DLC - David A. Lane collection, Atherton.

Hypochrysops lucilla D'Abrera, stat. rev.

(Figs 1-2)

Material examined. PAPUA NEW GUINEA: 1 ♀, Chimbu Province, Haia, Crater Mountain Wildlife Management Area, 760 m., 6°42'20"S, 144°59'55"E, 18.iii.2002, D.A. Lane. (in DLC).

Description. Female (Figs 1-2). Forewing length 19 mm. Head brown; a bright blue band below compound eyes, eyes brown; antennae slightly more than half length of costa. Thorax brown with distinct bright blue areas. Abdomen brown; upper segments with bright blue areas. Forewing with costa broadly bowed to apex, apex rounded, termen strongly convex, tornus

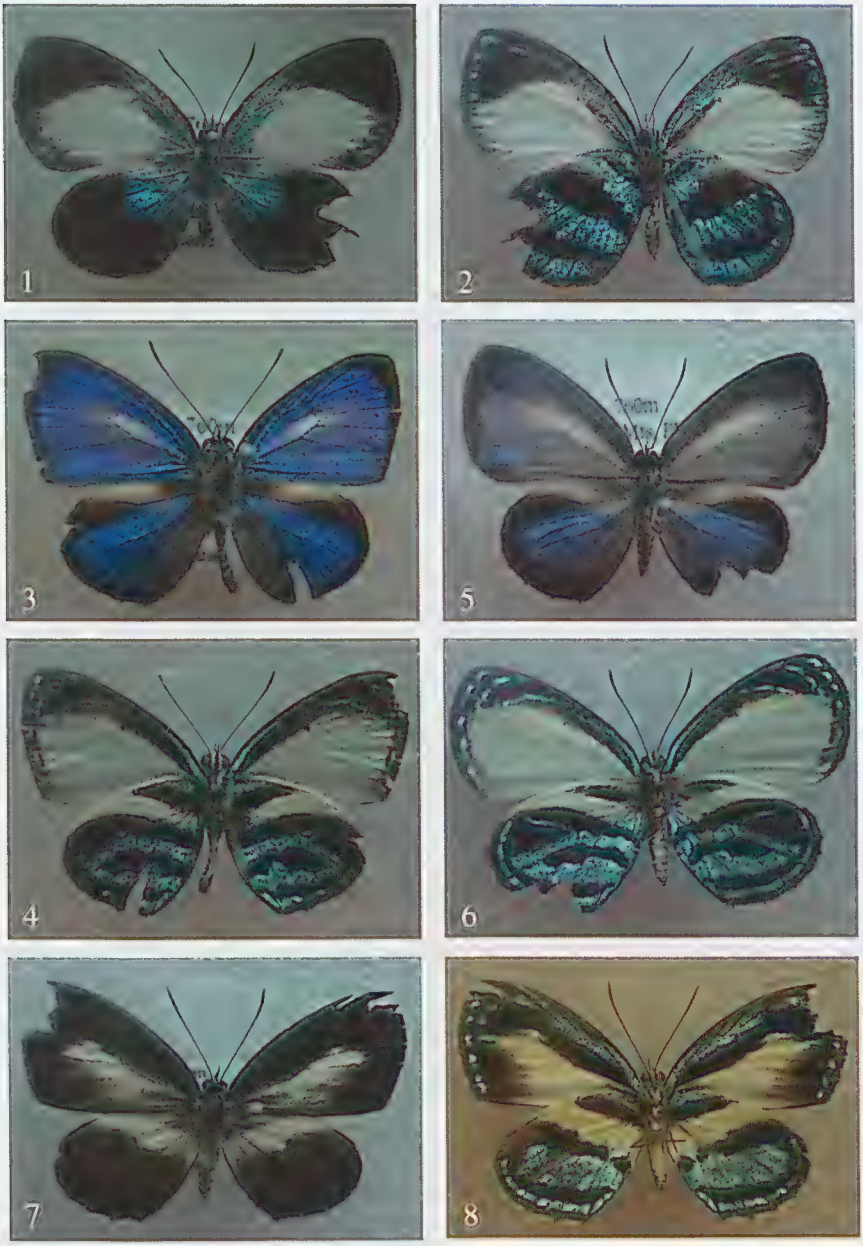
rounded, dorsum slightly rounded. Forewing upperside broadly black; a bright blue sub-basal area extends into upper half of discal cell. A broad white area extends from lower half of discal cell, across 2/3 to apex, then almost reaches termen and extends to dorsum; two bright blue spots lie adjacent to termen above tornus. Hindwing upperside broadly black; a bright blue basal and submedian area covers inner half. Forewing underside broadly white, extending basal to lower half of discal cell, 2/3 to apex, reaching termen and dorsum; costa narrowly black; apex black; a bright blue band extends basally along costa, almost reaching apex; a similar bright blue band extends along termen from apex, almost reaching tornus. Hindwing underside broadly black; inner basal bright blue band; a second sub-basal blue band extends from costa to dorsum; a third blue median to post median band extends from apex to inner dorsum; a fourth blue band, slightly offset, runs parallel to termen, extending from apex to tornal area.

Comments. The male holotype of *H. lucilla* was figured and described by D'Abrera (1971) from the single known specimen in The Natural History Museum, London. It was collected by A.S. Meek at Angabunga R. affl. of St. Joseph R., 6000 ft, November 1904 to February 1905. D'Abrera (1971), in his assessment of the species, noted a relationship to the members of the *heros* group of *Hypochrysops*, but he judged that distinctive differences warranted description as a separate species. D'Abrera (1971) also figured the male and female of *H. dohertyi* Oberthür and recorded its distribution as south-eastern Papua. Apart from the holotype, no further specimens have been collected and all subsequent specimens previously attributed to *H. lucilla* have been specimens of *H. dohertyi*.

Sands (1986) in his revision of *Hypochrysops*, placed *H. lucilla* as a subspecies of *H. dohertyi*, i.e. *H. dohertyi lucilla* D'Abrera, along with *H. d. dohertyi* Oberthür. Parsons (1998) followed Sands in his treatment of *H. dohertyi* and also illustrated the holotype male of *H. lucilla*, together with the female of *H. dohertyi* (both as *H. dohertyi lucilla*).

Examination of the illustrations of *H. dohertyi* given by D'Abrera (1971) and Parsons (1998), and of the holotype male of *H. lucilla*, shows them to be quite distinct. The most noticeable and distinctive feature is the forewing underside white patch of *H. lucilla*, which extends from basal 2/3 to apex, then across to the termen, tornus and dorsum. No other known species of *Hypochrysops* has this well developed white patch extending to the termen on the forewing underside.

In his revision, Sands (1986) erected species-groups and placed *H. dohertyi*, *H. doleschallii* (C. Felder), *H. herdonius* Hewitson, *H. heros* Grose-Smith, and *H. theon* C. & R. Felder in the *theon* species-group. All the above species, except *H. lucilla*, have to varying degrees a black termen on the underside of the forewing.



Figs 1-8. *Hypochrysops* spp., upper and undersides of adults. (1-2) *H. lucilla*, female; (3-6) *H. lustrare* sp. n.: (3-4) holotype male; (5-6) paratype female; (7-8) *H. heros imogena*, female.

The female of *H. lucilla* figured here (Figs 1-2) shows the same distinctive white forewing underside patch as the holotype male. The female hindwing underside also shows a noticeable similarity in pattern, especially in the positioning of the blue basal to terminal bands. The upperside of the female also shows many similarities in colour and pattern to the holotype male, making its overall facies very distinctive and indicating beyond doubt that they are conspecific. *H. lucilla* also clearly belongs with the *theon* species-group.

Hypochrysops lustrare sp. n.

(Figs 3-6, 9-11)

Types. Holotype ♂, PAPUA NEW GUINEA: Chimbu Province, Haia, Crater Mountain Wildlife Management Area, 760 m., 6°42'20"S, 144°59'55"E, 16.iii.2002, D.A. Lane (in ANIC). *Paratype* ♀, same data as holotype except 18.iii.2002, D.A. Lane (in ANIC).

Description. Male (Figs. 3-4). Forewing length 16 mm. Eyes brown; antenna slightly more than half length of costa; base of head and thorax grey, clothed in long grey hairs; a bright blue line extends from base of antenna immediately along base of compound eye. Abdomen grey; segment junctions ringed dull white. Forewing with costa gently bowed basally, fairly straight then from approx 1/4 to 3/4 towards apex; apex broadly rounded; termen convex for upper half, then straight to tornus; tornus sharply rounded; dorsum straight. Hindwing termen, tornus and dorsum all broadly rounded.

Forewing upperside broadly blue; lower half of discal cell dusted white; a purplish suffusion overlays lower half of discal cell and extends to termen between veins M_2 and 1A; costa, apex and termen narrowly edged black, widest at apex. Hindwing upperside broadly blue; a white patch extends above discal cell and vein Rs, reaching costa and apex; basally dark brown with a small bright blue patch at base of $Sc+R_1$; termen narrowly black; also wholly black between veins M_1 and Rs.

Forewing underside broadly white above dorsum and extending to lower half of discal cell and above vein M_2; costa black extending to about middle of discal cell in a broad arc to apex; termen narrowly black; a thin broken blue line extends from near tornus, slightly offset from and parallel to termen, reaching apex; a second slightly offset thin blue line extends across and roughly parallel to apex from above M_3 almost to costa; a third thin blue line extends basally and very slightly offset from and parallel to costa, to just beyond cell, then bows in a broad arc, almost intersecting base of second blue line at junction of black apical and broad white area. Hindwing underside broadly black; a white band basally edged blue extends in a broad arc from near dorsum across upper half of discal cell to apex, also extending narrowly along costa; a narrow inner black band runs basally to and parallel to this white band, extending from dorsum to near costa, with a bright blue band

basally above this; a thin blue line runs slightly offset from but parallel to termen, from inner tornus to apex; a slightly wider blue band of variable width extends dorsally immediately above tornus, in a broad arc and diverging outwards towards termen, extending to M_2; an inner median blue band of similar width runs from dorsum to base of cell, then extends outwards as infill between veins M_3 and CuA_1, intersecting the outer blue band; a fourth thin blue median line also extends outwards in a broad arc, from this median blue band, from below cell towards but not reaching apex.

Female (Figs 5-6). Forewing length 18 mm. Eyes brown; antenna half length of costa. Fore- and hindwings broader and more rounded than those of male. Forewing with costa broadly bowed to apex; apex broadly rounded; termen convex; tornus broadly rounded, meeting dorsum at obtuse angle; dorsum fairly straight. Hindwing termen, tornus and dorsum broadly rounded. Forewing upperside broadly blue; a purple suffusion overlays blue beyond discal cell between vein M_2 and dorsum; costa narrowly edged brown from base to apex; a narrow black outer margin extends from apex to tornus; lower half of discal cell dusted with white scales, more pronounced distally and extending slightly beyond cell between veins CuA_1 and M_2. Hindwing upperside broadly blue from base across cell and below M_1; a small blue patch lies above discal cell at junction of $Sc+R_1$; costa above cell and Rs pale white; area between Rs and M_1 broadly black; a black margin extends along termen to tornus. Underside similar to male; blue bands and lines slightly wider.

Male genitalia (Figs 9-10). Vinculum + tegumen ring oval; vinculum narrow; tegumen much broader; saccus moderately broad; sociuncus broadly rounded with numerous sclerotized hairs; sinus between sociunci very broadly V-shaped; brachia sharply bent, evenly tapering; valva subtriangular, base narrow, then tapering only slightly until near tip when it decreases rapidly in width to a blunt tip (the illustration shows it folded on itself), numerous sclerotized hairs towards tip; manica with hairs – part of manica and hairs may adhere to aedeagus in dissection; aedeagus short, broad, ventrally spiculate towards tip, with a heavily sclerotized apical process.

Female genitalia (Fig. 11). Papillae anales broad with numerous sclerotized hairs; apophyses posteriores short, slender; sinus vaginalis a broad pouch; ostium with strongly sclerotized collar; ductus bursae broad, long, longitudinally ridged internally, lightly sclerotized; corpus bursae elongate, narrow, poorly differentiated from ductus, without signa.

Etymology: From the latin *lustrare* = illuminate, or light up. Refers to the bright luminous-like features of this beautiful species.

Distribution. Known so far only from the immediate vicinity of Haia, Crater Mountain Wildlife Management Area, Chimbu Province, Papua New Guinea.

Comments. The underside blue bands of both male and female *H. lustrare* are distinctly deep blue in colour, as opposed to the greenish blue of *H. theon*. Also, with both sexes of *H. lustrare*, an additional underside hindwing blue band extends medially from just below cell in a broad arc towards the apex. The *H. lustrare* female upperside is very distinctive, with extensive areas of blue with purple overlay. This differs considerably from all known females of *H. theon*.

The genitalia are quite diagnostic compared with *H. theon milesius* (Röber) (Figs 12-13) from southern Papua New Guinea and *H. theon medocus* (Fruhstorfer) (Figs 15-16) from Cape York Peninsula, Australia. Genitalic structures within this group look similar overall but differ consistently in the size and shape of the different parts of the genitalia and the combinations of these. In the male genitalia of *H. lustrare* the distal margin of the sinus is almost a straight, broad V whereas in *H. theon* the margin is sinuate. The valva in *H. lustrare* is narrower at the base but maintains its width distally more than in *H. theon*, so that it is more truncated in appearance at the tip. Sands (1986) described the valva of *H. theon* as slightly flanged and in this terminology that of *H. lustrare* would be broadly flanged. The aedeagus of *H. lustrare* is significantly narrower and shorter than in *H. theon*. In the female genitalia, *H. lustrare* has narrower papillae anales and shorter apophyses posteriores, the sclerotized ostial collar is much shorter than in *H. theon* (Fig. 14) and the longitudinal ridges of the ductus bursae are less sclerotized.

H. lustrare is closely related to *H. theon*, and clearly belongs within the *theon* species-group (Sands 1986). The known distribution of *H. theon* incorporates seven recognized subspecies, ranging from Halmaheira, Aru Islands and West Papua (formerly Irian Jaya) in Indonesia, to Papua New Guinea and northern Queensland. Males of *H. lustrare* are very close in wing markings to *H. theon milesius*, which is recorded from the Aru Islands, south-western West Papua and southern Papua New Guinea (Sands 1986). Females, however, are very different, with the blue upperside contrasting strongly with the black and cream upperside of *H. theon* females. Noticeable male and female genitalia differences between *H. lustrare* and *H. theon milesius* also support this separation.

The very similar underside patterning of the male and female specimens of *H. lustrare*, coupled with both having been collected within a few metres of each other, leaves no doubt as to their being conspecific.

H. lustrare adults, along with the female of *H. lucilla*, were all collected near an escarpment above the Wara (= water) Nimni (river) at Haia, in an area rich in *Drynaria* sp. (Polypodiaceae) ferns, *Myrmecodia* sp. (Rubiaceae) plants, plus a multitude of other arboreal fern and epiphytic species. Several other species of *Hypochrysops* were also collected in this same vicinity, as discussed below.

Figs 9-16. Male and female genitalia of *Hypochrysops* spp. (9-10) male genitalia *H. lustrare*; (11) female genitalia *H. lustrare*; (12-13) male genitalia *H. theon milesius*; (14) female genitalia *H. theon milesius*; (15-16) male genitalia *H. theon medocus*.

Distribution records

Distribution records, plus observations of biology or behaviour are presented for the following seven species. All specimens bear the same locality data: Haia, Crater Mountain Wildlife Management Area, 760 m, Chimbu Province, Papua New Guinea, 6°42'20"S, 144°59'55"E, (date), D.A. Lane. All specimens in DLC.

Hypochrysops heros imogena D'Abrera
(Figs 7-8: female)

Collected on 16.iii.2002, the single female observed appears closest to *H. h. imogena*, which has been recorded from Karkar Island and Lae, Papua New Guinea. *H. heros heros* Grose-Smith and *H. heros polemon* (Fruhstorfer) are recorded from West Papua (= Irian Jaya) (Sands 1986). This record extends the known distribution of this species into the central highlands area where, along with the following species, it was collected in the same vicinity as *H. lucilla* and *H. lustrare,* on an escarpment above the Wara Nimni [River].

Hypochrysops apollo wendisi Bethune-Baker

One female, 14.iii.2002. Sands (1986) gave the distribution of *H. a. wendisi* as northern West Papua (= Irian Jaya) to northern Papua New Guinea and neighbouring islands, and that of *H. apollo phoebus* (Waterhouse) as southern Papua New Guinea and Cape York Peninsula, Queensland. Parsons (1998) listed *H. a. phoebus* from several localities in southern and eastern mainland Papua New Guinea as well as Cape York Peninsula, and listed *H. a. wendisi* from Karimui, Chimbu Province (on the mainland) and from West New Britain Province and New Ireland. The above female shows some similarity to *H. a. wendisi* as figured by Parsons (1998) and is tentatively placed here until further material becomes available. Karimui lies immediately due west of Haia.

Hypochrysops cleon Grose-Smith

One male, 4.iii.2002, is similar to the specimen from Gabensis, Morobe Province figured by Parsons (1998). The Haia specimen differs from Parsons' illustration in the hindwing underside having a much more extensive white patch near the apex, and the hindwing upperside being a paler shade of purple, lighter in colour than the forewing. This contrast in wing colouration is a noticeable feature shared by males from Iron Range, Queensland (in DLC and ANIC), which also exhibit a wider forewing black apical margin compared with specimens from Papua New Guinea.

Hypochrysops arronica arronica (C. & R. Felder)

One female was collected at Haia on 2.iii.2002 and others observed. A male was observed fleetingly as it pursued a female, but disappeared into the canopy. The collected female was flying in the immediate vicinity of *Myrmecodia* sp. plants growing on a variety of rainforest trees, including

Alphitonia sp. (Rhamnaceae) and *Ficus* sp. (Moraceae). These same trees were inhabited by large numbers of black *Iridomyrmex* sp. ants, which colonized and nested within the *Myrmecodia* sp. plants, as well as in the ground at the tree bases. Considerable skeletonising of the *Myrmecodia* leaves suggested previous larval feeding, however such scarred tissue was not indicative of recent feeding. Two hatched ova were found, deposited at the base of leaf stems, adjacent to the plant's tuberous segment. Szent-Ivany and Carver (1967) recorded pupae of this species within *Myrmecodia* sp. plants, attended by *Iridomyrmex* sp. ants, from the Musgrave River valley, NNE of Port Moresby.

Hypochrysops pythias drucei Oberthür

One male was collected and others observed at the escarpment edge of the Wara Nimni [River], at Haia, on 14.iii.2002. The hostplant, *Commersonia* sp. near *C. bartramia* (Sterculiaceae), was widespread in the vicinity of Haia and many plants showed signs of larval feeding patterns (as observed in north Queensland). Numerous early instar larvae were found; however these could not be reared through to adults, due to time constraints.

Hypochrysops polycletus rex (Boisduval)

Adults were common in the vicinity of Haia and were encountered in both rainforest and garden areas. The hostplant, *Rhyssopterys timorensis* (Malphigiaceae), was widespread in the area and larvae were regularly found on this plant, usually unattended by ants. Males often perched on trees adjacent to or overhanging pathways, at heights of 2 to 5 m, and engaged in territorial behaviour pursuing other males, or other butterflies, that entered their territory. Females usually perched on shrubs adjacent to their foodplant vines or along tracks and remained fairly inactive for most of the day, except between 11 am and 2 pm (approximately).

Hypochrysops sp. unidentified

Many larvae (2nd to 4th instars) were found feeding upon the leaves of an *Alphitonia* sp. (Rhamnaceae), attended by a black *Iridomyrmex* sp. ant. Larvae constructed shelters by silking several leaves together and remained therein during the day. Larvae fed at night by skeletonising the leaves and also chewed holes in the leaf membrane. These larvae were very similar in appearance to larvae of *Hypochrysops apelles* (Fabricus), (as observed in north Queensland; Braby 2000). However the attendant ant species were not *Crematogaster* sp., indicating a species quite separate from *H. apelles*. Time constraints prohibited rearing these larvae through to adults.

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